



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,696	02/28/2005	Lothar Dunsch	F-8521	7489
28107 7590 10/01/2007 JORDAN AND HAMBURG LLP 122 EAST 42ND STREET SUITE 4000 NEW YORK, NY 10168			EXAMINER SMITH, JENNIFER A	
			ART UNIT 1709	PAPER NUMBER
			MAIL DATE 10/01/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/519,696

Applicant(s)

DUNSCH ET AL.

Examiner

Jennifer A. Smith

Art Unit

1709

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☒ Claim(s) 10-11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>12/27/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Application

Claims 1-11 are pending and presented for examination.

Priority

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been received in the National Stage application from the International Bureau (PCT Rule 17.2(a)).

Information Disclosure Statement

The information disclosure statement filed on 12/27/2004 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed.

In addition, publication dates must be included on applicant's IDS form for non-patent literature documents.

It has been placed in the application file, but the information referred to therein has not been considered.

Claim Objections

Claim 1 is objected to because of the following informalities: Claim five reads, "method for synthesizing endohedral fullerenes *it an* arc reactor". Claim should read "method for synthesizing endohedral fullerenes *in an* arc reactor".

Claim 5 is objected to because of the following informalities: Claim five reads, "wherein the reactive gas component includes *of* ammonia or methane". Claim should read, "wherein the reactive gas component includes *an* ammonia or methane".

Appropriate correction is required.

Claim Rejections - 35 USC § 112, 1st paragraph

Scope of Enablement

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims because the specification, while

Art Unit: 1709

being enabling for the use of a nitrogen-containing or carbon-containing reactive gas component, such as ammonia, methane, or other hydrocarbon, **does not reasonably provide enablement** for the use of *any two elements* in the inert gas or inert gas mixture.

Attention is directed to *In re Wands*, 8 USPQ 1400 (CAFC 1988) at 1404 (CAFC 1988) at 1404 where the court set forth the eight factors to consider when assessing if a disclosure would have required undue experimentation. Citing *Ex parte Forman*, 230 USPQ 546 (BdApl's) at 547 the court recited eight factors:

1) *The nature of the invention:*

The instant invention is drawn to a method for synthesizing endohedral fullerenes.

2) *The state of the prior art:*

As the state of art recognizes, there are various gas components involved in the production of fullerenes. For example, helium, and nitrogen are listed as being the primary gas components for the production of an endohedral fullerene in US 6,303,760 B1. The specification discloses that previous techniques have employed only inert gaseous compounds in the arc reactor.

3) *The relative skill of those in the art:*

The relative skill of those in the art is high.

4) *The predictability of the art:*

The high degree of unpredictability in the production of endohedral fullerenes is well known in the art. A slight change in the method of preparation would drastically change the resultant structure of the fullerene.

5) *The breadth of the claims:*

Applicant's assertion that **any two elements** can be used as the reactive gas component in the synthesizing of endohedral fullerenes. This does not commensurate with the scope of the objective enablement, especially in view of the high degree of unpredictability and the limited working examples.

6) *The amount of guidance/working examples:*

The specification only exemplifies a few examples of such gas components such as ammonia and methane. The specification fails to show any support for the use of any other reactive gases aside from those mentioned above.

The specification provides lack of evidential support substantially where any skilled artisan cannot clearly understand how the claimed invention is achieved at the time of the invention with the information provided and thus, the claims are considered not enabled with the information given.

7) *Quantitation of undue experimentation.*

Since insufficient teaching and guidance have been provided in the specification, one of ordinary skill in the art, even with high degree of skill, would not be able to synthesize endohedral fullerenes with any two elements in the reactive gas component.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraph of 35 U.S.C. 102 that forms the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Dorn et al. (US 6,303,760 B1)

In the instant case, claim 1 is drawn to a method for synthesizing endohedral fullerenes in an arc reactor comprising:

- burning off graphite electrodes
- in an atmosphere which contains a reactive gas component

and providing said reactive gas component:

- with at least two elements in an inert gas or inert gas mixture.

Art Unit: 1709

The *description of the preferred embodiments* of Dorn et al. (US '760 hereafter) teaches a method for making metallofullerenes using a Kratschmer-Huffman generator (arc reactor) [column 4, lines 65-66]:

- a potential is applied across graphite electrodes [column 5, lines 59-60]
- helium is introduced into the reaction chamber along with a small amount of nitrogen gas. [column 5, lines 41-42]

Here nitrogen is the reactive component.

In the instant case, claims 2, 3 are drawn to the method of claim 1 wherein the inert gas or mixture includes 5% by volume to 60% by volume of reactive gas component, or more specifically 5% to 10%.

US '760 teaches the method in which the dynamic atmosphere ranges from about 300 ml/min to 1250 ml/min helium and about 20 ml/min to about 300 ml/min nitrogen gas. [column 5, lines 43-45]. With nitrogen as the reactive gas component and helium as the inert gas, this specification encompasses the range of 1.6% to 100% by volume and anticipates claims 2 and 3 of the instant application.

In the instant case, claim 4 is drawn to the method of claim 1 wherein the inert gas or inert gas mixture includes a nitrogen-containing or carbon-containing reactive gas component.

US '760 teaches the method in which the source of nitrogen is preferably a nitrogen containing gas. [*column 5, lines 54-55*]

In the instant case, claim 5 is drawn to the method of claim 1 where the reactive gas component includes ammonia or methane or other hydrocarbons.

US '760 teaches the method in which the source of nitrogen in the process is preferably a nitrogen containing gas. [*column 5, lines 54-55*] Because methane is a nitrogen containing gas, claim 6 is anticipated by US '760.

In the instant case, claim 6 is drawn to the method of claim 1 where the reactive gas component is supplied to the arc reactor from outside during the burning off or is generated in the arc reactor.

US '760 teaches the introduction of helium along with a small amount of nitrogen gas into the evacuated reaction chamber. [*column 5, lines 41-42*] The packed graphite rod was vaporized in a dynamic helium atmosphere containing a small amount of nitrogen gas. [*column 8, lines 59-61*]

In the instant case, claim 7 is drawn to the method of claim 1 where graphite electrodes are used which are modified with metal or metal oxides.

US '760 teaches the graphite rods are typically cored and filled with a mixture of metal oxide and graphite. [*column 5, lines 10-11*]

In the instant case, claim 8 is drawn to the method of claim 1 where graphite electrodes which are used are modified with holmium or scandium or their oxides.

US '760 teaches preferably the metal oxide is a rare earth metal or a group IIIB metal. Metal oxides may include, but are not limited to Ho_2O_3 , etc. [*column 5, lines 12-15*]

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dorn et al. (US '760)

The instant claim is drawn to the method of claim 1, where the graphite electrodes which are used are modified with metal or metal oxides and a nitrogen-containing substance.

US '760 teaches the process of as evidenced in the 102(b) rejection of claim 1. The instant claim differs from US '760 because US '760 fails to teach a nitrogen-containing substance along with metal or metal oxides in the modified graphite electrodes.

However, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify US '760's teaching because US '760 teaches a method for making an endohedral metallofullerene comprising charging a reactor with a first metal,

Art Unit: 1709

carbon, and nitrogen; and reacting the nitrogen, the first metal, and the carbon in the reactor to form an endohedral metallofullerene. [*Dorn et al. Claim 16*] The nitrogen component is preferably a gas but modifying the graphite electrode with a nitrogen substance, as evidenced in claim 27 where the nitrogen of claim 16 is carbon nitride or metal nitrides containing the 'first metal' of claim 16, is also possible.

One would have been motivated to make such modification because it is well known in the art that nitrogen is an essential starting material for the process of making endohedral fullerenes. The phase of the nitrogen is the only modification and one would expect similar results as those in the process using gas phase nitrogen. The industrial applicability would have been greatly increased by such modification and one would have been expected reasonable success because the modification is considered well within the level (capability) of the ordinary skill in the art. Therefore, the claim 9 is obvious and not patentably distinct over the prior art of the record.

Allowable Subject Matter

Claims 10-11 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Art Unit: 1709

Claims 10 and 11 are drawn to a method of synthesizing endohedral fullerenes, where the graphite electrodes are modified with metal cyanamide, or more specifically, calcium or lead cyanamide.

US 760 teaches the process as evidenced in the U.S.C. 102 and 103 rejections above. However, US 760 does not teach modifying the graphite electrodes with a cyanamide. Furthermore, there is no prior art on record that would provide a motivation for the addition of a metal cyanamide to the graphite electrode.

Conclusion

Claims 1-9 are rejected.

Claims 10-11 are objected to.

No claims are allowed

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Smith whose telephone number is 571-270-3599. The examiner can normally be reached on Monday - Friday, 8:30am to 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on 571-272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1709

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jennifer A. Smith
September 6, 2007
Art Unit 1709

JS

VICKIE Y. KIM
SUPERVISORY PATENT EXAMINER

